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Hair Shedding Scores Relating to Maternal Traits and Productivity in Beef Cattle

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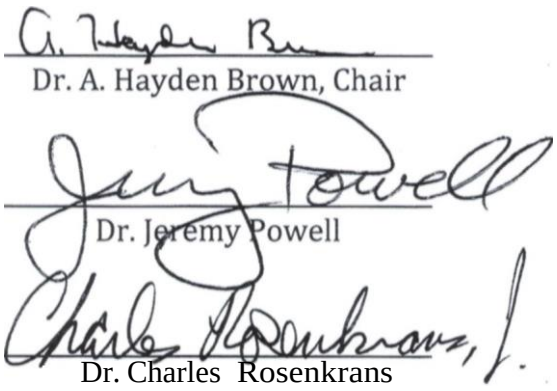

Abstract:

The objectives of this study were to measure how quickly cattle shed their winter coat in the sub-tropical climate of Arkansas. As well as, to understand the role age may play on cattle shedding efficiency in spring and summer months, in conjunction with the relationship between mother hair coat and calf sex. Angus based commercial beef cattle (n = 224) were observed over a five-month period in 2012. Once monthly, at approximately 28-day intervals, cattle were evaluated for shedding on a scale from 1 to 5. A score of 5 indicated the cow/heifer had a full winter coat and a score of 1 represents a slick, short summer coat. Genotypic and phenotypic data were collected and analyzed in PROC LOGISTIC of SAS. Shedding was found to occur relatively quickly. In March, all cattle still had their winter coats; however, by July, most cattle displayed fully shed, slick coats. Between May and June 98% of the cattle had reached their initial shedding, and by July all cattle had shed at least 50% of their winter coat. In this study, older cattle were found to shed their hair coats at a faster rate than younger cattle. The data collected also showed that the likelihood of a cow or heifer producing a heifer calf increases as the length of their hair decreases. Producers seeking cattle that can maintain homeostasis better in the summer months should score their cattle's hair coat shedding according to the scale in this study to discover which cattle shed more efficiently. The ones that shed their coats earlier in the year could have a better chance to produce heifer calves than those who shed their coats at a slower rate. This may mean that cattle that shed more efficiently might have had a higher artificial insemination frequency rate because x-sorted semen was utilized.

Key words: hair coat shedding, heat stress, cattle

Introduction:

During the winter, cattle develop a thick hair coat to keep warm, but as summer months approach and temperatures begin to rise, shedding the winter coat is essential. Longer, thicker, and darker hair coats will maintain body heat well, thus making the animals warmer (Gray et al., 2011). Cattle are susceptible to heat stress in high temperatures, especially when coupled with humidity. If cattle overheat then production factors such as fertility, milk production and quality, growth, and even death can occur (Bilby et al., 2008).

Cattle dissipate heat mainly through evaporative cooling but also through sweating. Humidity, wind speed, and physiological effects such as respiration rate, density and activity of sweat glands affect how efficiently they can cool themselves. Shade greatly helps to reduce heat stress; it can decrease the impact of radiated heat on cattle by 30% (Blackshaw and Backshaw, 1994). This will assist in maintaining production and lessen the chance of heat stroke. Elevated temperatures will affect cattle with dark, thick, wooly coats drastically more than those with slick, short summer coats. In the sub-tropical climate of the United States, which includes Arkansas, cattle that do not shed their winter coat as efficiently show more signs of heat stress (Gray et al., 2011).

In the alligator species, offspring sex is determined by nest temperature 20-35 days after egg laying. Higher temperatures (34°C or above) will produce males, a middle range temperature (30-33.9°C) will result in both males and females, and lower temperatures (less than 30°C) yield females. Thus, cooler temperatures yield female offspring (Ferguson, 1983). Though alligators are reptiles and cattle are mammals, temperature effects on progeny sex in cattle remains an interest. Currently, progeny sex of cattle can be manipulated by breeding females to cell-sorted semen (Seidel, 2002); however, the semen is more expensive and may result in reduced pregnancy rates (Seidel, 2002).

The objectives of this study were to measure how quickly cattle shed their winter coat in the warm and humid climate of Arkansas. As well as, to understand the role age can play on cattle shedding efficiency in spring and summer months, and the relationship between mother hair coat and calf sex.

Material and Methods:

Animals:

Hereford and Black Angus crossbred cattle (n = 224) were used for this study. Cattle were located near Savoy, AR at the University of Arkansas' cow-calf facilities. Observations were made on the cattle during March through July, and the cows ranged in ages from 2 to 16 years of age. All cows, if bred, were scheduled to calve in Fall 2012.

Shedding Scale:

Hair shedding scores were collected monthly based on a 1-5 coat shedding scale (Table 1). A panel of university faculty, staff, and students were provided a scale for shedding progress and requested to record their individual shedding assessments based on the following scale (5 = thick winter coat, 4 = initial shedding has begun, 3 = half of shedding is complete, 2 = most shedding is complete, 1 = slick, short summer coat) (Figures 1-5).

Data:

Data were collected and analyzed on initial hair shedding by month, half shedding by month, final shedding by month, and by shedding efficiency. Calf sex was analyzed based on hair shedding scores of mother cows during the observed months. All of the shedding scores were based on the scale explained in Table 1.

Results:

As temperatures increased across summer months, cattle began shedding hair coats. In March, all cattle still had winter coats, however, by July most cattle displayed fully shed, slick coats. Graph 1 indicates all initial hair shedding occurred between the months of April and June with 98% occurring between just the latter two months. According to the data, the percentage of cattle reaching the first shedding score increased from April (2%) to May (31%), and increased again in June (67%). According to Graph 2 and Table 2, the majority of observed cattle had a hair coat shedding score of 3 (50% shed) or less by June (96.2%), and all the cattle had a 3 or lower score by July (100%). This occurred quickly as in April only 2.7% of cattle were scored as a 3.

Looking at how age affects the rate of coat shedding, the data collected in May, when only 11.7% of total cattle had a shedding score of 3 or less, indicates that older cows shed their coats quicker (Graph 3). Of the older cattle, ranging from 8 to 16 years old, 90.2% were given a score of 1, 2, or 3. In the same month, the younger cattle, ages 2 to 7 years old, only 16.33% received a shedding score of 3 or lower.

Table 3 shows the odds ratios for how often or how many times more likely one coat score is to have a heifer calf over a bull calf when compared to another coat score in this data set. For example, according to the table, a cow or heifer with a coat score of 2 or 3 is 7.11 times more likely to have a heifer calf than a cow or heifer with a coat score of 5. However, a coat score of 4 compared to a coat score of 5 is only twice as likely to produce a heifer calf. A cow or heifer with a coat score of 2 has relatively the same chance as a heifer or cow with a coat score of 3 at giving birth to a heifer calf in this data.

According to these data, the likelihood of having a heifer calf from a cow or heifer with a coat score of 2 or 3 is approximately 80% whereas receiving a heifer calf from cattle with a coat score of 4 is around 55%, and from a coat score of 5 the likelihood is only 37% (Graph 4).

Discussion:

Cattle in this study with shorter hair coats were shown to produce female offspring. This relates to the study conducted by Gray stating that longer, thicker hair coats will increase animal's internal temperature (Gray et al., 2011). As cattle hair coat shedding scores decrease, their internal temperature may also decrease. These data show that cattle with shorter hair, and presumably a cooler internal temperature, are more likely to produce female calves. The shedding efficiency could be related to how physically fit the cattle were to carry a calf.

Implications:

According to this study, hair coat shedding occurs mainly over a three-month period for Angus based commercial beef cattle in Northwest Arkansas. Producers should rate their herd(s) on a scale from 1 to 5 once a month starting in April and continuing until the coat is slick. Female cattle with shorter hair coats, scores of 1, 2, or 3 in May, may have a greater chance of producing heifer calves. Additional research is needed to confirm the relationship between hair coat shedding score and progeny gender, and possible mechanisms governing that association.

Figure 1. Hair Coat Shedding Score 5 indicating a full winter coat (0% shed).

Figure 2. Hair Coat Shedding Score 4 indicating initial shedding has begun; there is a completely slick strip down the spinal area of the animal. Approximately 25% of the entire coat is shed.

Figure 3. Hair Coat Shedding Score 3 indicating half of the coat is short hair (50% shed). The head, hindquarters, and topline of the animal's body is slick.

Figure 4. Hair Coat Shedding Score 2 indicating the animal has shed to below the middle rib cage area (75% shed).

Figure 5. Hair Coat Shedding Score 1 indicating a slick summer coat (100% shed).

Table 1. Hair Coat Shedding Score Scale	
Hair Coat Shedding Score	**Explanation**
5	Thick winter coat (0% shed)
4	Initial shedding has begun (25% shed)
3	Half of shedding is complete (50% shed)
2	Most of shedding is complete (75% shed)
1	Slick summer coat (100% shed)

Table 2. Percentage of cows with at least half their winter coat shed by month						
Month	**1**	**2**	**3**	**4**	**5**	**% With Score 1-3**
March	0	0	0	1	223	0%
April	0	1	5	43	174	2.7%
May	0	7	19	78	118	11.7%
June	48	79	73	8	0	96.2%
July	124	51	12	0	0	100%

Table 3. Odds ratios of coat scores to calf sex (heifer vs. bull)	
Coat Score	**Odds Ratio**
2 vs. 3	1.00
2 vs. 4	3.46
2 vs. 5	7.11
3 vs. 4	3.46
3 vs. 5	7.11
4 vs. 5	2.05

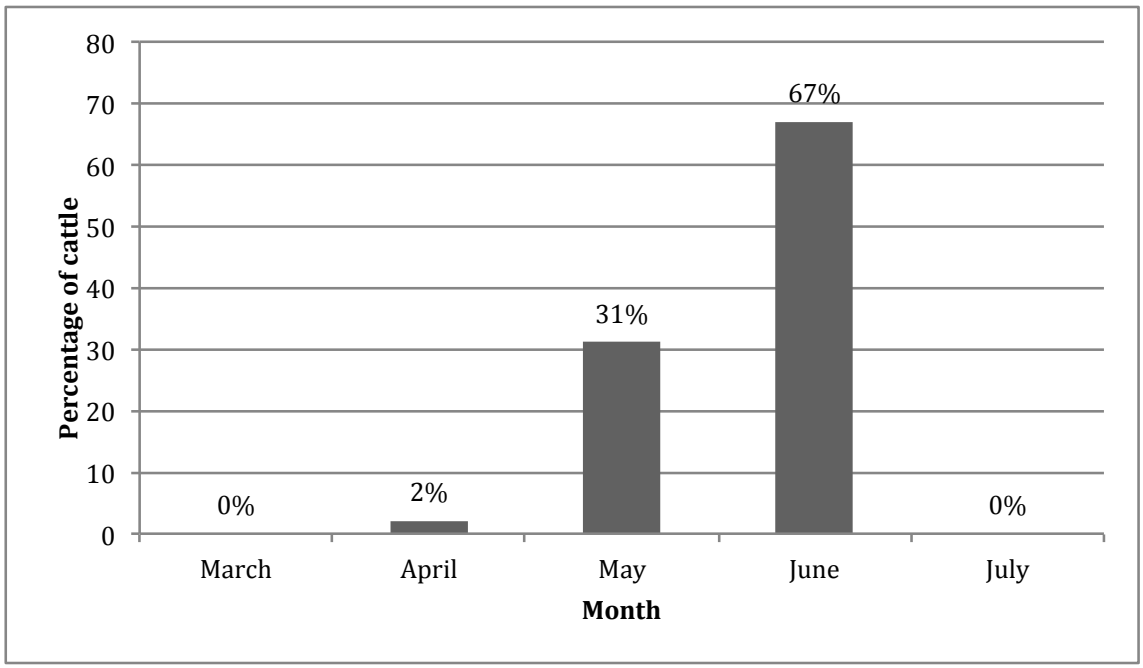

Figure 6. The percentage of cattle reaching their initial shedding score as a function of month.

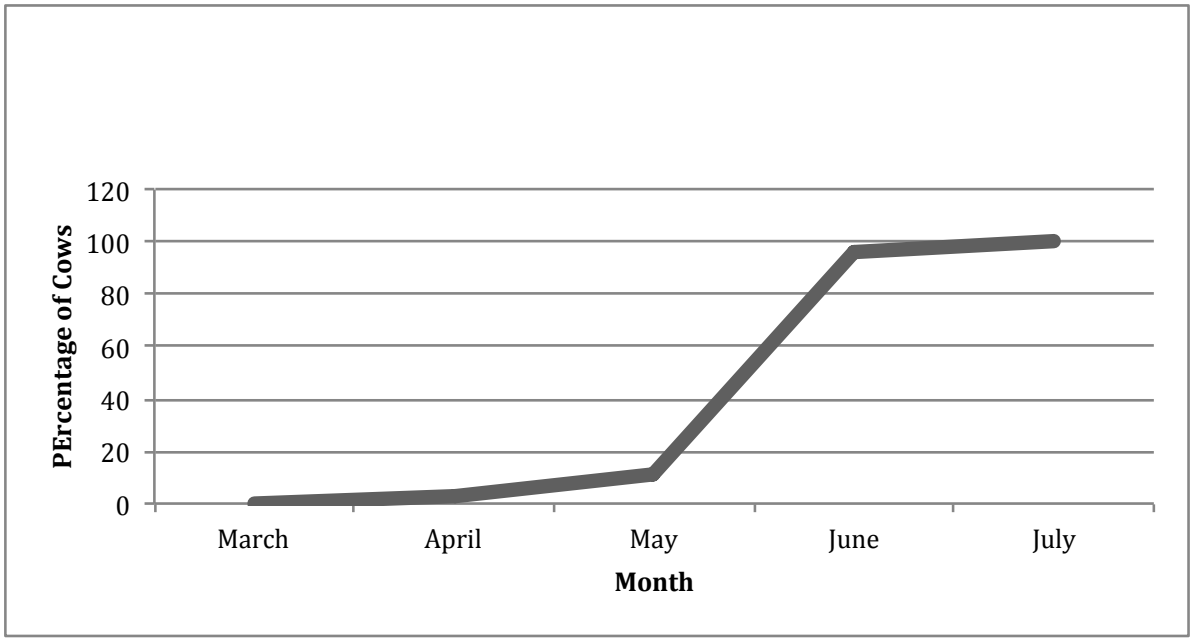

Figure 7. The percentage of cows with half their winter coats shed as a function of month.

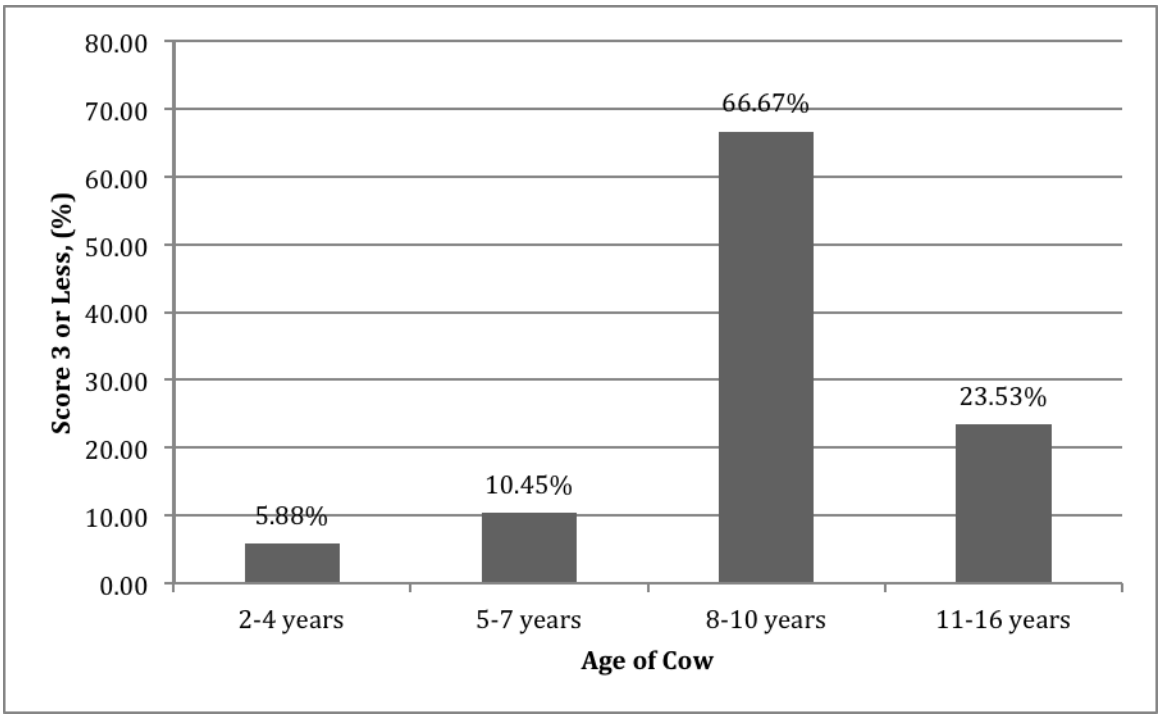

Figure 8. Cows with a shedding score of 3 or less in May as a function of age.

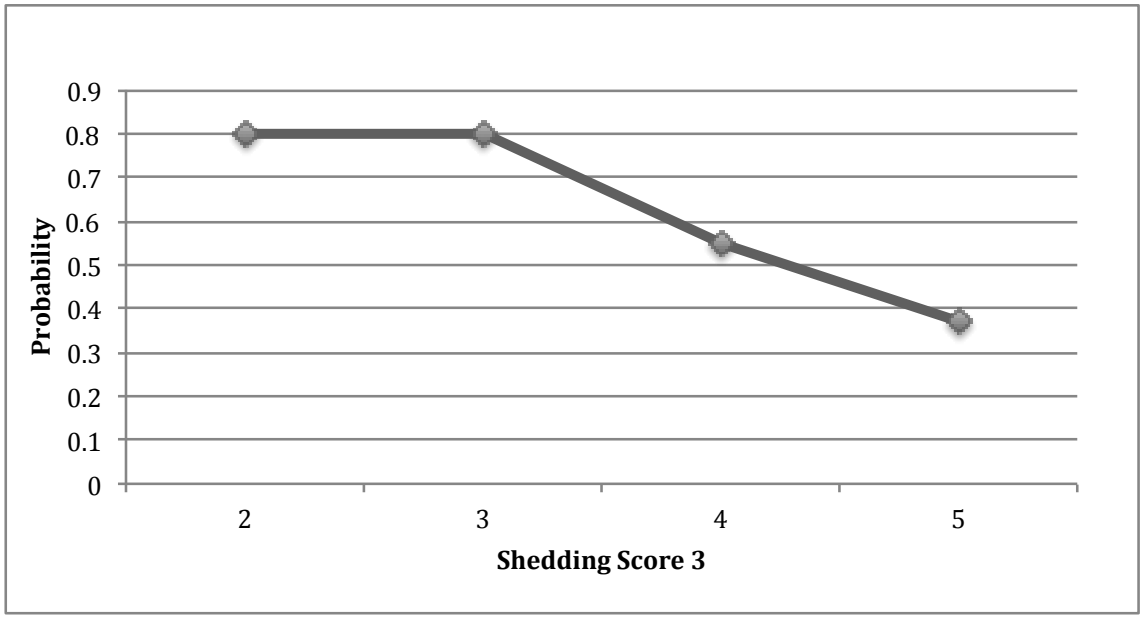

Figure 9. The predicted probabilities of the third hair shedding score (recorded in May) to producing a heifer calf.

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